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Gross et al.

4,666,446

4,759,761

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[54]	TELESCOPIC DEVICE FOR AN INTRAOCULAR LENS
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[73]	Assignee: Visioncare Ltd, Yehud, Israel
[21]	Appl. No.: 08/882,972
[22]	Filed: Jun. 26, 1997
[51]	Int. Cl. ⁶ A61F 2/16
[52]	U.S. Cl 623/6
[58]	Field of Search 623/6
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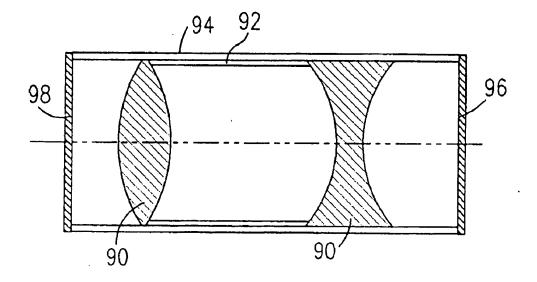
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Primary Examiner-David H. Willse Attorney, Agent, or Firm-Darby & Darby

ABSTRACT

An intraocular lens implant for implantation in the interior of a human eye comprising a telescope body having an anterior end and a posterior end and including at least one window sealed to the telescope body at at least one of the anterior end and the posterior end and at least two lenses disposed within the telescope body intermediate the anterior end and the posterior end.

14 Claims, 4 Drawing Sheets



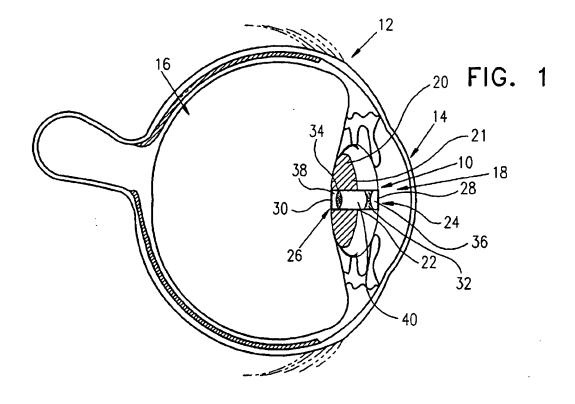


FIG. 2

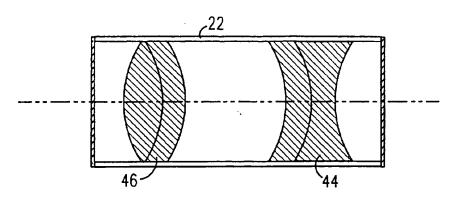
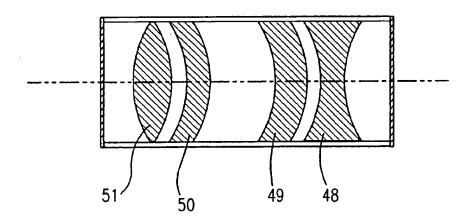
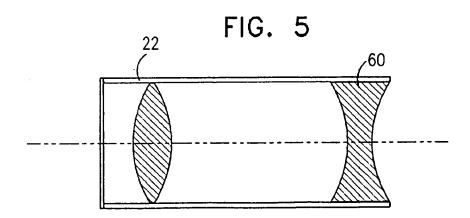
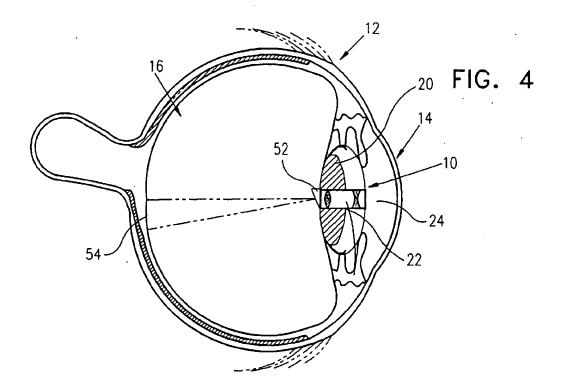
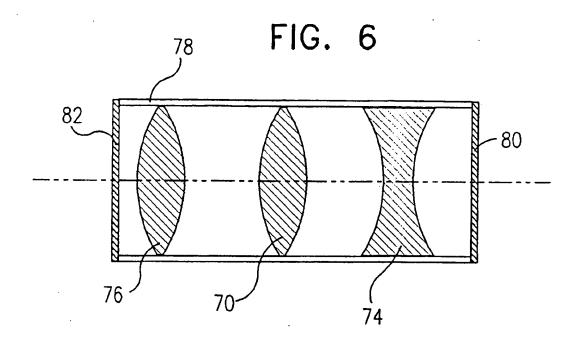


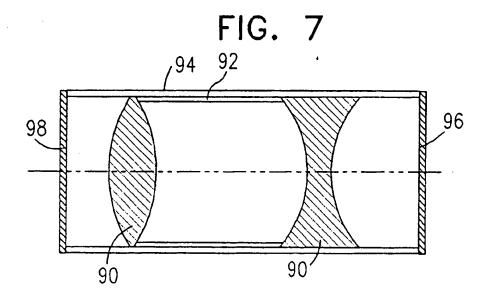
FIG. 3











TELESCOPIC DEVICE FOR AN INTRAOCULAR LENS

FIELD OF THE INVENTION

The present invention relates to intraocular lens implants generally.

BACKGROUND OF THE INVENTION

Various types of intraocular lens implants are known in the patent literature. Particular reference is made to U.S. Pat. Nos. 5,391,202 and 5,354,335 of the present applicant/assignee and to the references cited therein. Other relevant references include European Published Patent Application EP-A-212616, U.S. Pat. Nos. 4,074,368; 4,172,297; 4,759, 15761 and 5,275,623 and French Published Patent Application 2,666,735.

The utility of intraocular lens implants is described in the above patent references. The disclosures of the abovementioned publications are hereby incorporated by reference.

SUMMARY OF THE INVENTION

The present invention seeks to provide improved $_{25}$ intraocular lens implants.

There is thus provided in accordance with a preferred embodiment of the present invention an intraocular implant for implantation in the interior of a human eye comprising a telescope body having an anterior end and a posterior end and including at least one window sealed to the telescope body at at least one of the anterior end and said posterior end and at least two lenses disposed within the telescope body intermediate the anterior end and said posterior end.

In accordance with a preferred embodiment of the present 35 invention, the lenses are doublet lenses.

Preferably, the windows are generally without optical power.

In accordance with a preferred embodiment of the present invention air gaps are defined between the lenses and between the lenses and the windows.

In accordance with a preferred embodiment of the invention, one of the windows may define a prism.

In accordance with an alternative embodiment of the 45 present invention, the lenses may be joined together by a cylindrical member disposed within the telescope body.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be understood and appreciated more fully from the following detailed description, taken in conjunction with the drawings in which:

FIG. 1 is a simplified pictorial illustration of an intraocular insert constructed and operative in accordance with a preferred embodiment of the present invention located within a human eye;

FIG. 2 is a simplified pictorial illustration of an intraocular insert of the general type shown in FIG. 1, but including joined doublet lenses;

FIG. 3 is a simplified pictorial illustration of an intraocular insert of the general type shown in FIG. 2, but including separated doublet lenses;

FIG. 4 is a simplified pictorial illustration of an intraocular insert, located within a human eye, of the general type 65 shown in FIG. 1, wherein one of the windows comprises a prism;

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FIG. 5 is a simplified pictorial illustration of an intraocular insert of the general type shown in FIG. 1, but having only one window;

FIG. 6 is a simplified pictorial illustration of an intraocular insert of the general type shown in FIG. 1, but including more than two lenses; and

FIG. 7 is a simplified pictorial illustration of an intraocular insert of the general type shown in FIG. 1, wherein a telescope is encapsulated within an outer housing having windows.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Reference is now made to FIG. 1, which is a simplified pictorial illustration of an intraocular insert constructed and operative in accordance with a preferred embodiment of the present invention located within a human eye.

As seen in FIG. 1, there is provided an intraocular lens implant, indicated generally by reference numeral 10, which is implanted in the interior of a human eye 12. In the illustrated embodiment, the implant comprises a telescope 18 which preferably extends through at least a portion of a lens capsule 20 of the eye 12. The telescope 18 may extend forwardly of the lens capsule 20 toward the anterior side 14 of the eye. Alternatively it may extend posteriorly of the lens capsule or both.

In accordance with a preferred embodiment of the present invention, the telescope 18 is mounted on a carrying lens 21. Alternatively, the telescope 18 may be mounted in the lens capsule by loops or any other suitable apparatus.

In the illustrated embodiment of FIG. 1, it is seen that the telescope comprises a telescope body 22, typically of circular cylindrical configuration and formed of glass or other suitable non-porous bio-compatible material or other material which is coated with a suitable non-porous bio-compatible material.

Sealed to anterior and posterior ends 24 and 26 of the telescope body 22 are respective windows 28 and 30 which preferably do not have optical power. Mounted onto telescope body 22 intermediate windows 28 and 30 there are provided forward and rearward lenses, 32 and 34. Preferably air gaps 36 and 38 are defined between lenses 32 and 34 and respective windows 28 and 30 and an air gap 40 is defined between lenses 32 and 34.

According to an alternative embodiment of the present invention, illustrated in FIG. 2, joined doublet lenses 44 and 46 may be employed to avoid chromatic aberrations.

According to a further alternative embodiment of the present invention, illustrated in FIG. 3, joined doublet lenses 48 and 49 and 50 and 51 may be employed. The configuration of FIG. 3 may be used to provide enhanced optical

According to another alternative embodiment of the invention, illustrated in FIG. 4, one of the windows may be in the form of a prism 52, thereby to direct light passing therethrough off-axis onto a portion 54 of the retina which lies alongside portions of the retina which may have been rendered inoperative by disease.

According to further alternative embodiments of the present invention, illustrated in FIG. 5, one of the windows may be eliminated and one of lenses, here indicated by reference numerals 60, also serves as a window.

According to yet another alternative embodiment of the present invention illustrated in FIG. 6, an additional lens 70 may be provided spaced from forward and rearward lenses

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74 and 76 respectively along a telescope body 78 between windows 80 and 82.

According to yet another alternative embodiment of the present invention illustrated in FIG. 7, a plurality of lenses 90 may be joined together by a cylindrical member 92 5 disposed within a telescope body 94 intermediate windows 96 and 98.

It will be appreciated by persons skilled in the art that the present invention is not limited by what has been particularly shown and described hereinabove. Rather the scope of the present invention includes both combinations and subcombinations of the various features described hereinabove as well as variations and further developments thereof which would occur to persons skilled in the art upon reading the above description and which are not in the prior art.

We claim:

- 1. An intraocular lens implant for implantation in the interior of a human eye comprising a telescope body having an anterior end and a posterior end and including at least one window sealed to the telescope body at at least one of the anterior end and said posterior end and at least two lenses disposed within the telescope body intermediate the anterior end and the posterior end, wherein said at least two lenses are joined together by a cylindrical member disposed within the telescope body.
- 2. An intraocular lens implant according to claim 1 and wherein at least one of said at least two lenses are doublet lenses
- 3. An intraocular lens implant according to claim 2 and wherein said at least one window is generally without optical power.

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- 4. An intraocular lens implant according to claim 2 and wherein air gaps are defined between the lenses and between the lenses and said at least one window.
- 5. An intraocular lens implant according to claim 2 and wherein at least one window defines a prism.
- 6. An intraocular lens implant according to claim 2 and wherein said doublet lenses are joined doublet lens.
- 7. An intraocular lens implant according to claim 2 and wherein said doublet lenses are separated doublet lens.
- 8. An intraocular lens implant according to claim 1 and wherein said at least one window is generally without optical power.
- 9. An intraocular lens implant according to claim 8 and wherein air gaps are defined between the lenses and between the lenses and said at least one window.
- 10. An intraocular lens implant according to claim 8 and wherein at least one window defines a prism.
- 11. An intraocular lens implant according to claim 1 and wherein air gaps are defined between the lenses and between the lenses and said at least one window.
- 12. An intraocular lens implant according to claim 11 and wherein at least one window defines a prism.
- 13. An intraocular lens implant according to claim 1 and wherein at least one window defines a prism.
 - 14. An intraocular lens implant according to claim 1 and wherein one of said lenses is a positive lens disposed towards said posterior end and another of said lenses is a negative lens disposed towards said anterior end.

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(12) United States Patent Glick et al.

(10) Patent No.: (45) Date of Patent:

US 6,616,692 B1 Sep. 9, 2003

(SI) INTRAOCULAR LENS COMBINATIONS

(75) Inventors: Robert E. Glick, Lake Forest, CA (US), Dantel G. Brady, San Jean Capistrano, CA (US)

(73) Assigner: Advanced Medical Optics, Inc., Santa Ana. CA (US)

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: 09/390,380

(56)

Sep. 3, 1999

Reinted U.S. Application Data Provisional application No. 6G/132,081, filed on Apr. 30, 1999.

im. Cl.' U.S. Cl. A61P 2/16 623/6.34; 623/6.37 Field of Search 623/6.11, 5.22, 623/6.34, 6.37, FOR 105

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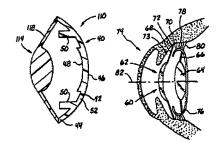
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Primary Examiner—David H. Willse (74) Anorney, Agent, or Firm—Stout, Uxz, Buyan & Mullins, LLP; Frank J. Uxz; Pater Jon Gluck

ABSTRACT

Off, the combination are provided which include a first optic having a negative optical power and being adapted to be placed in a substantially flixed position in ammanian eye. A second optic having a higher optical power than the first optic is provided, the addition, a movement assembly in provided which is cougled to the second optic and is adapted to cooperate with the eye to effect accommodating movement of the second optic in the eye. Very effective accommodation is provided with the present intraordar lens combinations can be effectively positionated to effectively positionated to effectively positionated to effectively positionated to effectively inhibit or reduce the risk of postection capsular opanification (PCO).

24 Claims, 2 Drawing Shoets



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US006599317B1

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US 6,599,317 B1 t: Jul. 29, 2003 (10) Patent No.: (45) Date of Patent:

(54) INTRAOCULAR LENS WITH A TRANSLATIONAL ZONE

(75) lave	(US), Ma	Charles X. Li secud Ghaziza	ao, Irvins, Ca	
(75) lave	TX (US):	Charles X. Li secud Ghaziza	ao, irvins, (ú

(73) Assigner: Advanced Medical Optica, Inc., Santa Ana, CA (US)

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 47 days.

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Sep. 7, 2000 (22) Filted:

Prior Publication Data (65)

(65)

Reinted U.S. Application Data

(60) Providonal application No. 60/154,745, fixed on Sep. 17, 1959.

Int. Cl.⁷ A61F 2/16
U.S. Cl. 623/6.34; 623/6.37; 623/6.25
Field of Search 673/6.11, 5.13,
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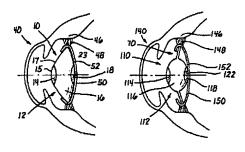
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Primary Examiner—David H. Willse (74) Anorney, Agent, or Form—Stort, Uxe, Buyan & Mullins LLP, Frank Uxe; Peter Jon Gluck

ABSTRACT

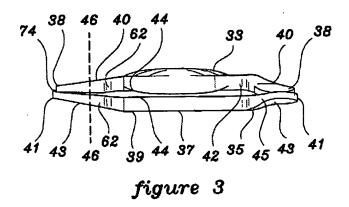
An intracrulist less (10L) for eac in a mammalian eye includes an optic adapted to focus light toward's retine of the mammalian eye and, in cooperation with the mammalian eye, ic provide accommodation, the optic incheding a finit portion adapted to move in mepones to the action of the mammalian eye; and a second portion secured to the first portion and having a higher index of refraction than the first portion and/or being positioned generally anterior of the first portion.

31 Claims, 2 Drawing Sheets



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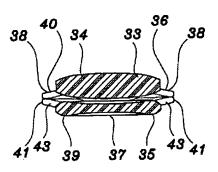
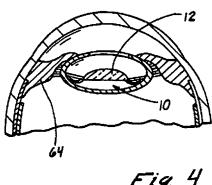
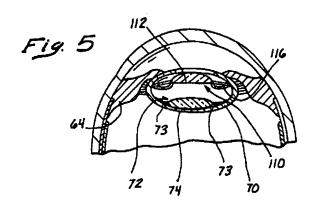


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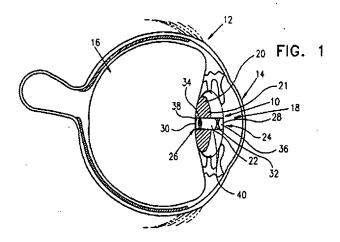
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(12) United States Patent Glick et al.

(10) Patent No.:

US 6,616,692 B1 (45) Date of Patent: Sep. 9, 2003

(54)	ENTRAOCULAR LENS	COMBINATIONS

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		Canistrana CA (15)

(73) Assigner: Advanced Medical Optica, Inc., Samz Ana, CA (US)

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(22) Filed: Sep. 3, 1999

Rointed U.S. Application Data
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(51) Int. Cl.* A51F 2/16 (52) U.S. Cl. 623/6.34, 623/6.37 (58) Floid of Search 623/6.11, 6.22, 623/6.34, 6.37, FOR 105

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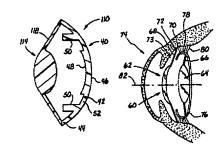
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Primary Examiner—David H. Willse (74) Antorsey, Agent, or Firm—Stout, Uxe, Buyan & Mullins, LLP; Frank J. Uxe; Peter Jon Gluck

(57) ABSTRACT

(57) ABSTRACT
Intracular lens combinations are provided which include a first optic having a negative cytical gower and being adapted to be placed in a substantially fixed position in a mannatilian eye. A second optic having a higher optical power than the first optic in provided, this is cougled to the second optic and is adapted to cooperate with the eye to effect recommodating movement of the second optic in the eye. Very effective scommodation is provided with the present intraocular lens combination. The present combinations can be effectively indicated to effectively indicate or effectively indicate or effectively positioned to effectively indicate or effective or effective or effective or effective or effectiv

24 Claims, 2 Drawing Sheets



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(12) United States Patent Weinschenk, III et al.

(10) Patent No.: (45) Date of Patent:

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(54)	ENTRAOCULAR LENS WITH A	
	TRANSLATIONAL ZONE	

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(73) Assigner: Advanced Medical Optica, Inc., Santa Ana, CA (US)

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(22) Filod: Sep. 7, 2000

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(65)

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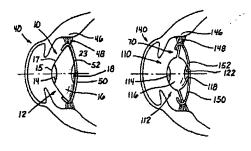
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Primary Examiner—David H. Willse (74) Antorney, Agent, or Firm—Stout, Uxa, Boyan & Mullins LLP, Frank Uxa; Peter Ion Glack

ABSTRACT

An intraceular lens (IOL) for use in a mammalian eye inchess an optic sciepto to focus light toward a retina of the mammalian eye, so provide accommodation, the optic including a first portion adapted to move in response to the action of the mammalian eye; and a second portion secured to the first portion and having a ligher index of refraction that the first portion and/or being positioned generally anterior of the first portion and/or being positioned generally anterior of the first portion.

31 Claims, 2 Drawing Sheets



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16		63830			2003		20	Accommodati
197		63830		U		1028	13	Monofocal i
18		63830		Ü		1028	19	Vision pros
19			99977	Ŭ		1023	26	Accommodati
20		200301		Ŭ		1002	17	Accommodati
21		200301		U		1002	6	Adjustable
22	US 2	200301	87503	U	2003	1002	18	Intraocular
23	US 2	200301	71808	U	2003	0911	18	Accommodati
24	US (561669	2 B1	U		0909	11	Intraocular
25			58599	U		0821	9	Accommodati
26	US (559931	.7 Bl	U		0729	12	Intraocular
27	US.	200301	35272	U	2003		17	Accommodati
38	US.	200301	35271	U		0717	7	In-vivo adi
29	US (559262	1 81	U		0715	4	Flexible in
30	US.	200301	30/32	U		0710	29	Haptics for
24			25806	U		0703	18	Binocular l
36		558576		U		0701 0619	19 36	Intraocular
34		200301	09926	U		0612	16	Intraocular Accommodati
36	US 2	200301	09925	Ü		0612	10	Accommodati
132		557601		Ü		0610	19	Binocular l
147		557601		U		0610	7	Multifocal
38	US :	200301	05522	U		0605		Multi-focal
39	US :	200300	93150	U		0515	19	Lanses capa
40	บร	200300	93149	U	2003	0515	29	Multi-focal
41		555799		U	2003	0506	11	Multifocal
42		200300		U		0501	19	Intraocular
43		555485		U		0429	18	Accommodati
44			78658	U		0424	8.8	Single-piec
45			78657	U		0424	88	Materials f
46			78656	Ų		0424	88	Accommodati
47		554782		U		0415	13 12	Opthalmic 1
48 49		200300 553731		U		0327 0325	12 11	Intraocular Binocular l
50		553381		Ü		30318	12	Intraocular
51			50696	Ü		0313	6	Lens for in
55			50695	Ŭ		0313	13	INTRAOCULAR
53			045931	Ŭ		0306	13	Ophthalmic
54		652738		U		30304	14	Multifocal
5.5			033013	U		30213	44	Method of u
56	บร		018384	U	2003	30123	20	Accommodati
57			018383	U		30123	18	Vision pros
58			014107			30116	11	Multifocal
59		65032		U		30107	11	Accommodati
60			193876	U		21219	9	Accommodati
61		64949		U		21217	38	Accommodati
62			188352	U		21212	19	INTRAOCULAR
1127		20020. 648870	188351	U		21212 21203	12 16	Monofocal i Open chambe
64 65			JB B2 177896			21128	5	Accommodati
66		64748.		Ü		21105	16	Multifocal
67			161436			21031	8	Primary and
68			161434	Ū		21031	10	Moveable in
69			151973	Ū		21017	11	Intraocular
		64647				21015		Two-lens ad
71	US	64613	84 B1	U	2002	21008	13	Intraocular.
4					1			٧f
							00.000000	



(12) United States Patent Skotton

(10) Patent No.: (45) Date of Patent:

US 6,464,725 B2 Oct. 15, 2002

(54)	TWO-LENS ADJUSTABLE INTRAOCULAR LENS SYSTEM
	LENS SYSTEM

(76) Inventor: Bermt Christian Skotton, 273 Mather St., Picdmont, CA (US) \$4611-5154

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 6 days. (*) Notice:

(21) Appl. No.: 09/768,876

(65)

(56)

(22) Filed: Jan. 23, 2001

Prior Publication Data

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(S1) Int. Cl. A61F 2/16 (S2) U.S. Cl. 623/634; 623/637; 623/632 (S8) Fleid of Search 623/634, 537, 623/63, 6.32

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(5?) ABSTRACT

(27) Alson system for implantation in a human eye which makes it possible to restore accommodation. The lone asystem completes one attention tens (2) and a posterior tens (4), out of these two leaves one has postive and the other has negative lens power. Accommodation is achieved by varying the distance between the two lenses. This lens system can be made so as to generate large changes in optical power for small changes in position. It also allows the amount of change in distance between the lenses to be selected relievely independently of the optical power of the overall lens system.

9 Claims, 5 Drawing Sheets

